

DEVELOPMENT AND FORMATIVE ASSESSMENT  
OF A TYPE 2 DIABETES SOCIAL  
MARKETING INFOGRAPHIC

By

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Abstract: The prevalence of type 2 diabetes (T2DM) has increased rapidly within the last few years. The development of T2DM can lead to many health complications including microvascular and macrovascular diseases. Management of T2DM is possible through the alterations of some of the modifiable risk factors, which include healthful eating, regular physical activity, weight management or weight loss if needed, and medication if needed. Due to the need for T2DM education in Oklahoma, the Oklahoma Cooperative Extension Service (OCES) Family and Consumer Sciences (FCS) Adult and Older Adult Nutrition Specialist developed a T2DM education curriculum entitled “Live well, Eat well be Active with Diabetes” (LEAD). OCES FCS County Educators indicated a need for a supplemental visual social marketing tool they could use with consumers to support key T2DM and T2DM management concepts after attending in-service trainings on the LEAD curriculum. The purpose of this research was to develop and conduct formative assessment of a T2DM social marketing infographic, which OCES FCS County educators could use with consumers to visually reinforce key concepts presented in the LEAD curriculum. Based on a survey sent out to 51 County Educators, results showed that of the participating OCES FCS County Educators, 95% agreed the infographic was accurate, 97% agreed the infographic was easy for the Educators to understand, and 93% agreed the infographic would be easy for the consumer to understand. The majority of County Educators also found the infographic visually appealing related to the layout, artwork, and overall appearance of the infographic. County Educators also suggested the need for the addition of color to the infographic, the addition of contact information for further information, increasing the font size, and making the figure on the infographic unisex. In conclusion, the majority of OCES FCS County Educators agreed the infographic supplemented the LEAD curriculum and reinforced key concepts of T2DM including: 1) What is type 2 diabetes, 2) Effects of high blood glucose, and 3) Key concepts including: a) Living well, b) Eating well, c) Being physical active, and d) Maintaining a healthful weight.

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## CHAPTER I

### INTRODUCTION

The prevalence of diabetes and pre-diabetes has increased rapidly within the last few years with the majority of individuals diagnosed with type 2 diabetes (T2DM). On average 1.7 million people are newly diagnosed with diabetes a year (American Diabetes Association, 2014a). In Oklahoma alone, over 313,000 adults were diagnosed with diabetes in 2011. There has also been an increase in T2DM diagnosis among children and youth under 20 years of age even though older age is considered a risk factor.

If untreated T2DM can be accompanied by many health complications and even when treated T2DM can be very costly. Health complications associated with T2DM are either microvascular or macrovascular diseases, which can lead to further more serious complications (Cade, 2008). Depending on the age of diagnosis and the number of microvascular and macrovascular complications that accompany T2DM, the cost of treatment combined with the cost of living can be rather expensive. With the average age of diagnosis being between 55 and 59, the average lifetime cost of T2DM is \$84,000 for males and \$85,500 for females.

Risk factors for T2DM are separated into modifiable and non-modifiable. Modifiable risk factors are the most influential and include body mass index, fat distribution, physical inactivity, poor nutrition, hypertension, smoking, and alcohol use (Deshpande, Harris-Haye, & Schootman, 2008). Poor nutrition and weight gain are strong risk factors for T2DM and can be prevented.

Non-modifiable risk factors include age, family history of T2DM, history of gestational diabetes, low birth weight, and race/ethnicity.

Reducing the risk of T2DM is possible through the alteration of some, if not all, of the modifiable risk factors. Maintaining a healthy weight, regular physical activity, and eating a healthy diet can lower an individual's risk for T2DM (Harvard School of Public Health, 2014). These modifications work together to decrease insulin insensitivity and therefore improve the muscles' ability to absorb glucose. If someone has pre-diabetes or is at risk of developing T2DM recommendations are to maintain a healthy weight or for overweight or obese individuals to lose 7% of their body weight (National Diabetes Information Clearinghouse, 2013). Another recommendation is to participate in moderate physical activity for 150 minutes a week. Recommendations related to the diet include decreasing consumption of fat and calories, increasing consumption of whole grains, consuming 2-3 servings of vegetables a day, and consuming 2 servings of fruit a day.

Management of T2DM is focused on lowering glycated hemoglobin (A1c) to less than 7.0%, achieving a pre-prandial blood glucose between 80-130 mg/dl and a post-prandial blood glucose below 180 mg/dl (American Diabetes Association, 2015a). These goals can be achieved through healthful eating, regular physical activity, weight management or weight loss if needed, and medication if needed (American Diabetes Association, 2014b). It is recommended that individuals with T2DM consume a varying diet of nutrient dense foods in appropriate portions that provide adequate fiber, whole grains, and legumes, while being low in saturated and trans fats (Beigi, 2012; American Diabetes Association, 2013b). Moderate-intensity physical activity for 150 minutes a week is also recommended in order to improve the body's use of insulin, manage stress, lower blood cholesterol and blood pressure, and promote weight loss (American Diabetes Association, 2015c; U.S Department of Health and Human Services, 2008). A weight loss of 5 to 7% body weight can also improve insulin use, manage stress, and lower blood

cholesterol and blood pressure (American Diabetes Association, 2014d; American Diabetes Association, 2015c; Whitney & Rolfes, 2013). Medication may be used in combination with lifestyle changes and focuses on improving insulin sensitivity or increasing circulating insulin levels (Beigi, 2012). Educating individuals with T2DM on diabetes management is important because the individual is the one who has to monitor their daily self-management (Snoek, 2007). Varying barriers exist that decrease the level of adherence to self-management, but with education provided from the individuals' health care team most barriers encountered can be overcome.

Oklahoma Cooperative Extension Service (OCES) Family and Consumer Science (FCS) County Educators provide science-based educational programs to the citizens of Oklahoma to help address statewide issues within the Family and Consumer Sciences area (Oklahoma Cooperative Extension Service [OCES], 2015a). OCES FCS County Educators work within issue teams to address statewide issues. Health is one of the seven OCES FCS statewide issue teams (OCES, 2015b). The need for T2DM education was frequently reported as an "emerging issue" in the Spring 2015 FCS Program Advisory Council (PAC) Emerging Issues Report (Division of Agricultural Sciences and Natural Resources (DASNR), 2015).

In response to the need for T2DM education the OCES FCS Adult and Older Adult Nutrition Specialist developed an OCES diabetes education curriculum entitled "Live well, Eat well, be Active with Diabetes" (LEAD). The LEAD curriculum presents key concepts of diabetes including: 1) What is T2DM and 2) Effects of high blood glucose. The LEAD curriculum also presents key T2DM management concepts including: 1) Living well, 2) Eating well, 3) Being physically active and 4) Maintaining a healthful weight. The LEAD curriculum; however, does not address T2DM medication (Hermann, 2015).

The OCES FCS Adult and Older Adult Nutrition Specialist conducted five in-service trainings for OCES FCS County Educators on the LEAD curriculum. A total of 51 OCES FCS County Educators and four OCES FCS District Program Directors attended the in-service trainings on the LEAD curriculum. At the in-service trainings, OCES FCS County Educators indicated a need for a supplemental visual tool they could use with consumers to support key T2DM and T2DM management concepts presented in the LEAD curriculum.

Social marketing is a theoretical model, which can be used for promoting a healthy lifestyle and management of many chronic diseases such as T2DM (Gupta, Tyagi, & Sharma, 2013).

Infographics are a newer type of social marketing tool (Drell, 2014).

### ***Research Purpose and Objectives***

The purpose of this research was to develop and conduct formative assessment of a T2DM social marketing infographic, which OCES FCS County Educators could use with consumers to visually reinforce key concepts presented in the LEAD curriculum.

**Objective 1.** To develop a T2DM social marketing infographic, to supplement the LEAD curriculum, which reinforces key concepts of T2DM including: 1) What is diabetes, 2) Effects of high blood glucose and 3) Key T2DM management concepts including: a) Living well, b) Eating well, c) Being physically active, and d) Maintaining a healthful weight.

**Objective 2.** To conduct formative assessment of the T2DM social marketing infographic with OCES FCS County Educators who attended the LEAD curriculum in-service training.

### ***Assumptions***

1. Participants provided honest responses to the survey.

### ***Limitations***

1. Limited number of participants. Only 51 OCES FCS County Educators attended the LEAD curriculum in-service training. Three OCES FCS County Educators who attended the LEAD curriculum in-service training had retired prior to assessment of the T2DM infographic and one OCES FCS County Educators who attended the LEAD curriculum in-service was on maternity leave at the time of the T2DM infographic assessment. As a result only 47 OCES FCS County Educators received the e-mail solicitation to assess the T2DM infographic.
2. This project was only a formative assessment of OCES FCS County Educator's perceptions of the LEAD infographic. The results of this assessment cannot be extended to other populations.
3. Participants may have had response bias, meaning they may have provided answers they felt were more appropriate or are uncomfortable with sharing their real opinion.

## CHAPTER II

### REVIEW OF LITERATURE

#### *A Review of Diabetes*

Diabetes is classified into four different categories: type 1, type 2, gestational, and pre-diabetes, and each category has different symptoms and treatments. Type 1 diabetes occurs when the body does not produce the hormone insulin, which prevents the uptake of glucose into some tissues and the conversion of glucose into energy. Type 1 is present in a small proportion of people who have diabetes and can be treated with insulin therapy and diet. Gestational diabetes refers to high blood glucose levels during pregnancy when diabetes was not present before becoming pregnant. Hormones from the placenta cause insulin resistance in the mother's body, meaning the mother needs more insulin in order to convert glucose to energy (American Diabetes Association, 2014a). Implementing special meal plans, regular physical activity and insulin injections may be used to treat gestational diabetes. It is important to note that being diagnosed with gestational diabetes does not mean the person will have diabetes after giving birth. Pre-diabetes is a precursor to T2DM and denotes that blood glucose levels are higher than normal, but not yet high enough to be considered in the T2DM range. Treatment of pre-diabetes includes a healthy diet, physical activity, and maintaining a healthy weight. If pre-diabetes is not treated it could lead to T2DM, which is the development of insulin resistance and later the pancreas not being able to

produce enough insulin for the body. Insulin resistance causes high blood glucose levels and inhibits the body from being able to use glucose as a fuel source. When glucose cannot be used for fuel, the body must rely on ketone bodies, which the body cannot tolerate in large quantities. T2DM is the most common form of diabetes and treatment has to be personalized for each individual (American Diabetes Association, 2014a).

### ***Complications and Consequences***

Effective treatment of diabetes is important because diabetes can lead to various health complications either microvascular or macrovascular, which can then lead to organ and tissue damage, amputations and in some cases death. Macrovascular diseases involve any large blood vessel within the body such as the arteries and veins, and include cardiovascular disease, cerebrovascular disease, and peripheral artery disease. Cardiovascular disease occurs because diabetes increases oxidative stress and lipid peroxidation in the coronary arteries, which in turn promotes atherogenesis, or the build-up of plaque in the blood vessels and heart (Timmis, 2001). Around half of people with diabetes end up dying from cardiovascular diseases and it is the leading cause of death among people with T2DM (Timmis, 2001; World Health Organization, 2013; Cade, 2008). Traditional risk factors for cardiovascular disease include age, obesity, dyslipidemia, and hypertension; diabetes is considered a risk factor all on its own and usually is accompanied with some of the traditional risk factors and central adiposity (Cade, 2008).

Cerebrovascular disease is another macrovascular disease and refers to a stroke, inhibition of blood flow to a part of the brain. This is similar to cardiovascular disease, but instead of atherosclerosis occurring in the coronary arteries, the atherosclerosis forms in the intracranial or extracranial blood vessels. Cerebrovascular disease is the third leading cause of death in the

United States and people with T2DM are up to four times more likely than non-diabetics to fall victim to a stroke (Cade, 2008). As with cardiovascular disease, diabetes is its own risk factor and increases the chance of having the traditional risk factors, which include hypertension, dyslipidemia, heart failure, and atrial fibrillation (fast, irregular heart beat) (Cade, 2008). Other risk factors that accompany diabetes include hyperglycemia, hyperinsulinemia, retinopathy, and microalbuminuria (Cade, 2008).

Another macrovascular disease is peripheral artery disease (PAD), which is the build-up of atherosclerosis in arteries of the lower extremities. Common symptoms of PAD include pain, cramping, and aching from the buttocks down to the calves while walking; more extreme symptoms include foot ulcerations, rest pain, tissue loss, gangrene, and lower extremity amputation (American Diabetes Association, 2003; Cade, 2008). Risk factors for PAD include duration and severity of diabetes, peripheral neuropathy, hyperglycemia, hypertension, elevated fibrinogen, obesity, dyslipidemia, a history of cardiovascular disease, and physical inactivity (American Diabetes Association, 2003; Cade, 2008). While PAD has its own risk factors it is also a risk factor for cerebrovascular, cardiovascular and renal disease (American Diabetes Association, 2003).

Microvascular diseases involve the small blood vessels within the body such as capillaries, and include retinopathy, neuropathy and nephropathy. Retinopathy can lead to visual disabilities and blindness with the severity depending on whether the retina vessels are non-proliferative (blood vessels leak and swell, early stage), pre-proliferative (blood vessel is blocked and restricts blood supply) and proliferative (abnormal growth of new blood vessels) (Cade, 2008). Development of retinopathy depends on the duration of diabetes and glycemic control. Hyperglycemia can lead to impaired retinal blood flow, increased inflammatory cell adhesion to the retinal blood vessels and capillary blockage, which result in retinal damage (Cade, 2008).



Another microvascular complication is peripheral neuropathy, or nerve damage, which commonly affects lower-extremity sensation and causes lower-extremity pain. Loss of sensation is considered a negative symptom and when present often leads to ulcers and is the most common reason for amputations (Davies, Brophy, Williams, Taylor, 2006). Pain due to peripheral neuropathy has been shown in different studies to have a negative effect on quality of life compared to people with diabetes without peripheral neuropathy pain (Davies, et al., 2006). Risk factors for peripheral neuropathy in T2DM include poor glycemic control, age, duration of diabetes, dyslipidemia, hypertension, and presence of cardiovascular disease (Cade, 2008).

Another common microvascular complication associated with T2DM is diabetic nephropathy, more commonly known as kidney disease. Nephropathy is a progressive disease with the first sign being microalbuminuria (moderate albumin levels in the urine), progressing to overt albuminuria (increased albumin levels in urine), and then leading to kidney failure (Cade, 2008). Hyperglycemia forces the kidneys to increase their filtration rate and after a long duration, albumin starts to leak through the capillaries and ends up in the urine (American Diabetes Association, 2013a). Prolonged stress on the kidneys can eventually causes them to lose their filtering capacity leading to kidney failure and an increase in waste products in the blood. Diabetic nephropathy has similar risk factors to those of peripheral neuropathy including hyperglycemia, duration of diabetes, age of onset, dyslipidemia, hypertension, and obesity (Cade, 2008).

These various diabetes complications can decrease overall quality of life and may lead to mortality. Additional treatment can increase diabetes related expenses. The total cost of diagnosed diabetes, including direct cost and reduced productivity, in the United States in 2012 was \$245 billion; increasing medical cost more than twice the amount expenditures would be in the absence of diabetes (American Diabetes Association, 2014a). Similarly, the health care cost of someone with diabetes is two to three times higher than that of someone without diabetes

(World Health Organization, 2013). One study, based on the 2009-2010 National Health and Nutritional Examination Survey, conducted a T2DM simulation model in order to determine the lifetime cost of diabetes (Zhuo, Zhang, & Hoerger, 2013). Cost was broken down by annual expenditures per person on medication, physician visits, self-testing devices and complications associated with diabetes. Cost varied based on the year of diagnosis, gender, and if and what diabetic complications occurred after diagnosis (Table 1.) (Zhuo, et al., 2013).

**Table 1.** Diabetes expenditures based on year of diagnosis and gender.

Age of Diagnosis	Expenses for Males	Expenses for Females
25-44	\$124,700	\$130,800
45-54	\$106,200	\$110,400
55-64	\$84,000	\$85,500
65 and older	\$54,700	\$56,600

*Note.* Adapted from “Lifetime direct medical costs of treating type 2 diabetes and diabetic complications,” by Zhuo, X. et al., 2013, *American Journal of Preventative Medicine*, 45(3), 253-261.

From these lifetime costs 48-64% were attributed to diabetic complications with the majority being used to treat cerebrovascular and cardiovascular disease (Zhuo, et al., 2013). This study did not take into account the amount of money individuals lose due to reduced productivity (inability to work, sickness, premature retirement, etc.) caused by diabetes, therefore the overall cost of diabetes per individual may be much greater.

### ***Prevalence and Incidence***

The prevalence of diabetes and pre-diabetes has escalated quickly over the past few years. In 2010, 25.8 million Americans had diabetes and by 2012 the number of Americans with diabetes increased to 29.1 million with the majority of individuals having T2DM (American Diabetes

Association, 2014a; Fonseca, Kirkman, Darsow, & Ratner, 2012). These numbers do not include the prevalence of pre-diabetes, which estimates at 86 million, among Americans age 20 and older, as of 2012 (American Diabetes Association, 2014a). With the incidence of 1.7 million new diagnoses a year, estimates are that by 2050 one-third of the United States' population will be diagnosed with diabetes (American Diabetes Association, 2014a; Fonseca, et al., 2012). Even though T2DM is typically associated with older age, annually 5,089 people younger than age 20 are newly diagnosed with T2DM (Centers for Disease Control and Prevention, 2014)

In 2011, the number of adults diagnosed with diabetes in Oklahoma was over 313,000, which is higher than the national average (Oklahoma State Department of Health, 2014). According to the 2012 CDC report card, the state of Oklahoma is one of the leading contributors to the number of people diagnosed with diabetes and accounts for 10.1% of the United States' population diagnosed with diabetes (Centers for Disease Control and Prevention, 2012).

### ***Risk Factors***

T2DM risk factors can be categorized as non-modifiable, modifiable and psychosocial factors.

Non-modifiable risk factors for T2DM include age, family history of T2DM, history of gestational diabetes, low birth weight, and race/ethnicity. African Americans, Hispanics, Asian Americans, and Native Americans have a higher incidence of T2DM than whites (Mayo Clinic Staff, 2014).

Modifiable risk factors for the development of T2DM include increased body mass index (BMI), fat distribution, physical inactivity, poor nutrition, hypertension, smoking, and alcohol use (Deshpande, et al., 2008; Mayo Clinic Staff, 2014). Increases in BMI, or weight gain, and poor

nutrition have been determined to be strong modifiable risk factors for T2DM. Poor nutrition refers to consuming a high amount of calories of which a large proportion or composition are from fat and refined carbohydrates. Lastly, psychosocial factors including depression, increased stress, lower social support, and poor mental health status have been shown to increase the risk of T2DM (Deshpande, et al., 2008).

### ***Diabetes Prevention***

T2DM can be prevented; as previously mentioned, modifiable risk factors such as increased BMI, physical activity and poor nutrition are strong modifiable risk factors for T2DM. Various studies suggest weight loss, physical activity and dietary changes can lower the risk of T2DM in at risk populations (Harvard School of Public Health, 2014). Weight loss is associated with better glycemic control and a reduction in insulin insensitivity. Physical activity can lower blood glucose by improving the muscles ability to use insulin and absorb glucose. Modifying the diet by increasing whole grain consumption and decreasing consumption of refined carbohydrates has been reported to decrease the chance of T2DM occurring (Harvard School of Public Health, 2014). Also related to the diet, consuming 2-3 servings a day of vegetables and 2 servings a day of fruit have been determined to lower the risk for developing T2DM (Wu, Zhang, Jiang, & Jiang, 2014).

The following recommendations for T2DM prevention are based on the Diabetes Prevention Program. Weight loss of 7% followed by weight maintenance is recommended for individuals who are above a healthy weight range, meaning a BMI higher than 25 kg/m<sup>2</sup> (National Diabetes Information Clearinghouse, 2013). Individuals are recommended to participate in at least 150 minutes a week of moderate physical activity, which would include walking and biking.

Decreased consumption of fat and calories and increased consumption of whole grains, fresh fruits and fresh vegetables have also been recommended in order to prevent T2DM. Individuals in the Diabetes Prevention Program who participated in these lifestyle modifications reduced their risk of developing T2DM by 58% (National Diabetes Information Clearinghouse, 2013).

### ***Management of Type 2 Diabetes***

Management of T2DM involves many different aspects, which include healthful eating, physical activity, weight loss if needed or weight maintenance, and medication (American Diabetes Association, 2014b). In order to achieve healthful eating the ADA recommends eating a variety of nutrient-dense foods in appropriate portion sizes (American Diabetes Association, 2013b). A balanced diet for individuals with T2DM should also include an adequate source of fiber, whole grains, and legumes, while containing less than 7% saturated fat and reduced amount of *trans* fat (Beigi, 2012). When it comes to carbohydrate, individuals with T2DM are recommended to spread carbohydrates throughout the day, while keeping carbohydrate intake about the same at each meal (American Diabetes Association, 2014c). A practical way for individuals with T2DM to follow these recommendations is to use the plate method. The plate method allows individuals to choose different foods within a food group while keeping the portion sizes for the different food groups the same throughout the day (American Diabetes Association, 2015b).

Physical activity benefits individuals with T2DM by improving the body's ability to use glucose, aiding in weight loss, lowering blood cholesterol and blood pressure, and managing stress (American Diabetes Association, 2015c). The ADA recommends individuals with T2DM participate in at least 150 minutes of moderate-intensity physical activity, which corresponds to 30 minutes a day for 5 days a week (U.S Department of Health and Human Services, 2008).

Moderate-intensity physical activity includes bicycling, walking briskly, and dancing (United States Department of Agriculture, 2015). Another option for achieving the recommended amount of physical activity is participating in 75 minutes a week of vigorous-intensity physical activity, or a combination of the two (U.S Department of Health and Human Services, 2008). Vigorous-intensity physical activity includes running or jogging, swimming, and aerobics (United States Department of Agriculture, 2015). It is also recommended individuals with T2DM dedicate at least two days of physical activity to muscle strengthening activities (U.S Department of Health and Human Services, 2008). However, it is important that individuals with T2DM check with their doctor before changing their level of physical activity (American Diabetes Association, 2015d).

Weight maintenance, or weight loss if needed, is another factor that benefits individuals with T2DM by increasing the body's ability to use insulin, lowering blood cholesterol and blood pressure, and aiding in management of stress (American Diabetes Association, 2014d; American Diabetes Association, 2015c). Weight loss can be achieved by reducing the number of calories consumed per day, increasing the amount of physical activity an individual participates in, or through a combination of the two (Whitney & Rolfes, 2013). The ADA recommends a moderate weight loss of 5 to 7% body weight for individuals with T2DM who are overweight or obese (ADA, 2008; Whitney & Rolfes, 2013). Gradual weight loss is more beneficial to individuals with T2DM, meaning losing no more than 1 to 2 pounds a week (Beigi, 2012; Whitney & Rolfes, 2013).

Taking medications is also a part of living with T2DM. Treatment for T2DM not only requires lifestyle modifications, but also the use of the medication metformin (Beigi, 2012). Metformin is used in order to improve insulin sensitivity through the reduction of hepatic glucose production. Depending on the level of progression of T2DM, other medications may be prescribed that can

either improve insulin sensitivity or increase circulating insulin levels. All of these medications are aimed at lowering glycated hemoglobin (A1c) levels and maintaining glycemic control.

Goals for managing T2DM consist of an A1c less than 7.0%, pre-prandial blood glucose between 80-130 mg/dl, and post-prandial blood glucose below 180 mg/dl. However, these goals may be adjusted based on an individual's clinical characteristics and personal factors (Beigi, 2012; American Diabetes Association, 2015a). Managing T2DM and maintaining glycemic control has been proven to delay the onset and slow the progression of microvascular diseases, which include retinopathy, nephropathy, and neuropathy.

Education on T2DM management is needed for all individuals diagnosed, especially since the patient is primarily responsible for daily self-management (Snoek, 2007). There are many barriers to self-management of T2DM, which range from cultural beliefs and linguistics to discomfort and inconvenience. This combined with glycemic values being out of target having a negative effect on the patients' attitude and physical health can lead to low adherence to self-management. Education provided by the health care team can help patients manage negative glycemic values, as well as overcome most other barriers the individual encounters during self-management.

### ***Cooperative Extension Service***

Oklahoma Cooperative Extension Service (OCES) Family and Consumer Science (FCS) County Educators provide science-based educational programs to the citizens of Oklahoma to help address statewide issues within the Family and Consumer Sciences area (Oklahoma Cooperative Extension Service [OCES], 2015a). OCES FCS County Educators work within issue teams to

address statewide issues. Health is one of the seven OCES FCS statewide issue teams (OCES, 2015b). The need for T2DM education was frequently reported as an “emerging issue” in the Spring 2015 FCS Program Advisory Council (PAC) Emerging Issues Report (Division of Agricultural Sciences and Natural Resources (DASNR), 2015).

In response to the need for T2DM education the OCES FCS Adult and Older Adult Nutrition Specialist developed an OCES diabetes education curriculum entitled “Live well, Eat well, be Active with Diabetes” (LEAD). The LEAD curriculum presents key concepts of diabetes including: 1) What is T2DM and 2) Effects of high blood glucose. The LEAD curriculum also presents key diabetes management concepts including: 1) Living well, 2) Eating well, 3) Being physically active and 4) Maintaining a healthful weight. The LEAD curriculum; however, does not address T2DM medication (Hermann, 2015).

The OCES FCS Adult and Older Adult Nutrition Specialist conducted five in-service trainings for OCES FCS County Educators on the LEAD curriculum. A total of 51 OCES FCS County Educators attended the in-service trainings on the LEAD curriculum. At the in-service trainings, OCES FCS County Educators indicated a need for a supplemental visual social marketing tool they could use with consumers to support key diabetes and T2DM management concepts presented in the LEAD curriculum.

Social marketing is a theoretical model, which can be used for promoting a healthy lifestyle and management of many chronic diseases such as T2DM (Gupta, Tyagi, & Sharma, 2013).

Infographics are a newer type of social marketing tool (Drell, 2014).

### ***Models and Marketing***



There are many theoretical models used in health promotion based on behavior change theories. These theories are used to design programs and to explain why programs will be effective (Frost, 2008). Four common theoretical models used within a community are the health belief model, stages of change (transtheoretical), theory of planned behavior, and the social cognitive theory. The health belief model focuses on the individual and is based on the perceived threat of the condition. The individual will only take action if the threat is seen as serious and the benefits outweigh any barriers. The stages of change model is broken down into 5 stages, pre-contemplation, contemplation, planning, action, and maintenance. An individual is categorized into one of the stages based on their level of readiness for action. Theory of planned behavior states that an individual will act only after they develop an intention, meaning they have a positive attitude about the behavior or it is seen as subjective norm. The social cognitive theory takes into consideration the environments influence on the behavior and the individual has to believe they are capable of change. This theory takes into consideration the social ecological model (Frost, 2008).

Health promotion and nutrition intervention are commonly applied to an individual or community based on the social ecological model. The social ecological model takes into consideration all the levels of influence on behavior change; these levels include intrapersonal, interpersonal, organizations, communities, and public policies (American College Health Association, 2012). Concentric circles represent the levels in the social ecological model with intrapersonal being the innermost circle and public policies being the outermost circle. The intrapersonal level refers to individual characteristics such as knowledge, gender, race/ethnicity, economic status, and attitude. The next level, interpersonal, takes into consideration the individuals' social networks and social support groups; these social networks and groups refer to the individuals' family, work associates, and friends. Organizations are social institutions that have rules and regulations in order to operate such as a class schedule or competitiveness. Communities are the relationships

among the organizations within boundaries. Communities include but are not limited to farmers markets, fast food restaurants, transportation, and neighborhood associations. Public policies refer to the local, state, and national laws and policies (American College Health Association, 2012).

Social marketing can be used in coordination with the social ecological model in order to benefit individuals and the society as a whole. Social marketing is defined as a set of systematic procedures that focus on consumer behavior, developing clear messages, designing interventions, implementing interventions, and evaluating results on a continual basis (Contento, 2007). The four principles of social marketing include product, price, place, and promotion. Product refers to the voluntary behavior change and benefits gained from the behavior change (Parker et al., 2011). Price refers to any barriers the intended audience may have to overcome in order to make the behavior change. Place refers to where the intended audience will perform the behavior change or have access to the program. Lastly, promotion includes the variety of materials that can effectively reach the audience to promote the behavior change. When developing a social marketing tool it must be specifically designed for the intended audience and the benefits must outweigh or reduce any barriers the population would see as a concern, since the goal is to promote voluntary behavior change (Contento, 2007). Before finalizing any social marketing material, pre-testing the material with the intended audience is encouraged in order to further tailor the materials towards the audience in hopes of increasing its effectiveness.

Social marketing can be used for health promotion being that they have a shared theory (Griffiths, Stevens, & Parish, 2009). Both concepts are focused on achieving social good based on ethical approaches that are meant to engage and empower individuals and/or the community. Social marketing and health promotion focus on achieving positive behaviors (Griffiths, et al., 2009).

### ***Previous Social Marketing and Diabetes Studies***

As stated early, social marketing combined with health promotion can either lead to desired behavioral change or the health promotion message can be diminished or misunderstood (Griffiths, et al., 2009). The use of social marketing for health promotion can be focused to target a specific health related problem or disease. The use of social marketing has been implemented as a prevention method for T2DM and also as a way to increase self-management interventions (Rogers, Fine, Handley, Davis, Kass, & Schillinger, 2014; Thackeray & Neiger, 2002). The following are examples of the use of social marketing in T2DM prevention and management in order to determine whether social marketing combined with health promotion was successful.

Social marketing was implemented as a tool to prevent T2DM in the Bigger Picture campaign, which targeted minority and low-income youth (Rogers et al., 2014). The goals of the campaign were to promote youth health literacy and to increase interest and knowledge of adolescents in T2DM prevention. The information was distributed through one-hour live presentations of The Bigger Picture campaign used a Power Point format. The Power Point included facts and figures with embedded public service announcement videos. The effectiveness of the intervention was evaluated by having the youth answer three questions prior to the assembly and the same three questions after the presentation. Evaluation results demonstrated an increase in knowledge regarding each question. Presentations were complemented by the use of social media such as Facebook and Twitter. Evaluation of the effectiveness of online social media was measured by “Facebook likes” and “Twitter followers”. The campaign was determined to have the potential to engage youths in prevention of T2DM, but more media ideas were felt to be needed to distribute information on T2DM risk factors (Rogers et al., 2014).

Social marketing has also been used among individuals with T2DM in order to improve general knowledge of T2DM and self-management of T2DM (Kavin, Tiangco, Mauger, & Gabbay, 2010; Thackeray & Neiger, 2002). Being that social marketing is consumer focused, it could potentially be a more effective process than traditional approaches to diabetes self-management education (Thackeray & Neiger, 2002). One study developed a T2DM education book for patients to determine the books' overall impact on patient care (Kavin et al., 2010). Patients completed surveys after 4 weeks, 3 months, and 6 months of having the book and assessed knowledge, self-care behaviors, and disease-related distress. The study demonstrated that patients who received the books had improved level of T2DM knowledge, a decrease in distress, and an improvement in self-care behaviors.

Infographics are a type of social marketing tool that can and have been used in health promotion. One study used infographics as a social marketing technique and measured its effectiveness against videos in communicating breast cancer awareness among young women (Occa & Suggs, 2015). The study measured participants' level of breast cancer awareness, knowledge of breast cancer's diagnostic exams, attitudes toward breast self-exam, and intention to screen for breast cancer through a breast self-exam. The researchers found exposure to the infographic increased participants' breast cancer awareness, knowledge regarding diagnostic exams, attitudes towards self-exams, and intention to screen via a self-exam compared to participants who did not receive any information. However, the video social media was determined to have more of a positive influence in all categories compared to the infographic. Even though the use of infographics has increased within the past few years there is limited research referring to infographics being used for T2DM prevention or management.

### ***Basis for Formative Assessment***

Formative assessment is used to develop and improve ongoing educational programs or materials (Contento, 2007). Formative assessment is typically conducted in the early stages of development and is used enhance learning. In this study, formative assessment was conducted with OCES FCS County Educators on a type 2 diabetes infographic in order to determine the most effective way of informing consumers about key concepts of type 2 diabetes management.

## CHAPTER III

### METHODOLOGY

The purpose of this research was to develop and conduct formative assessment of a T2DM social marketing infographic OCES FCS County Educators could use with consumers to visually reinforce key concepts presented in the LEAD curriculum.

**Objective 1.** To develop a T2DM social marketing infographic, to supplement the LEAD curriculum, which reinforces key concepts of diabetes including: 1) What is T2DM, 2) Effects of high blood glucose and 3) Key T2DM management concepts including: a) Living well, b) Eating well, c) Being physically active, and d) Maintaining a healthful weight.

**Objective 2.** To conduct formative assessment of the T2DM social marketing infographic with OCES FCS County Educators who attended the LEAD curriculum in-service training.

#### ***Infographic Development***

The LEAD curriculum was reviewed to determine key concepts and sub-concepts presented.

The LEAD curriculum was determined to present key concepts about diabetes including: 1) What is T2DM and 2) Effects of high blood glucose. Key diabetes management concepts determined to be presented in the LEAD curriculum where: a) Living well, b) Eating well, c) Being physically active, and d) Maintaining a healthful weight (Hermann, 2015).

Under the concept of “Living Well,” sub-concepts determined to be presented in the LEAD curriculum were: 1) Having regular check-ups, 2) Having a health care team, and the importance of the individual with diabetes as a member of the health care team, 2) Being aware of the American Diabetes Association (ADA) target A1c level, 3) Keeping a record of blood glucose and being aware of the ADA target blood glucose ranges, 4) Importance of foot care and having regular eye and dental exams, 5) Understanding that illness and stress can raise blood glucose and learning what to do to control blood glucose with sick and how to manage stress (Hermann, 2015).

Under the concept of “Eating Well,” sub-concepts determined to be presented in the LEAD curriculum were: 1) There is no “one-size fits all” diabetic meal plan, 2) Total carbohydrate is the issue not just sugar, 3) Making healthy carbohydrate choices, 4) Spreading carbohydrate out across the day and having about the same amount of carbohydrate each day, 5) The Plate Method and carbohydrate counting including the ADA recommendation of a place to start is 45 to 60 grams of carbohydrate per meal, you may need more you may need less (Hermann, 2015).

Under the concept of “Being Active,” sub-concepts determined to be presented in the LEAD curriculum were: 1) Benefits of physical activity, 2) Recommendations for physical activity, 3) Physical activity intensity, 4) Types of physical activity, and 5) Safety precautions with physical activity (Hermann, 2015).

Under the concept of “Maintaining a healthful weight,” sub-concepts determined to be presented in the LEAD curriculum were: 1) Benefits of a healthful weight, 2) Recommendations for how

much weight loss is healthful, 3) Recommendations for the timeframe for healthful weight loss, and 4) Recommendations to lose weight through a combination of healthful eating and regular physical activity (Hermann, 2015).

The LEAD infographic content was developed based on the key concepts and sub-concepts determined to be presented in the LEAD curriculum.

Online diabetes infographics were reviewed to find example layouts, which could inform the development of the LEAD infographic layout based on the infographic content. An example diabetes infographic layout the researchers felt might be useful to inform the development of the LEAD infographic layout was located at Alert1 Medical Alerts (Alert1 Medical Alerts, n.d.).

The revised LEAD infographic content and example infographic layout were provided to the OSU Agriculture Communications Service. The OSU Agriculture Communications Service Marketing Specialist designed the LEAD infographic (Appendix A).

Expert face validity was conducted on the LEAD infographic content using a panel of three experts in the Department of Nutritional Sciences from Oklahoma State University. Each expert was emailed the LEAD infographic content and asked to respond with comments related to appropriateness, accuracy, readability, and suitability for people with T2DM. Based on the suggestions from the panel experts the LEAD infographic wording was revised.

The readability statistics of the revised LEAD infographic content was determined using Microsoft Word spelling and grammar (Microsoft, Redmond, WA). The revised LEAD infographic content Flesh-Kincaid grade level was determined to be 5.5 using PC SAS for Windows, Version 9.3 (SAS institute, Cary, NC).

### ***Formative Assessment Survey Development***



A formative assessment survey was developed to assess OCES FCS County Educators perception of the LEAD infographic. The survey assessed County Educators' perception of how well the infographic supported key concepts presented in the LEAD curriculum using a 3-point level of agreement Likert scale ("agree," "neither agree or disagree," "disagree"). The survey also assessed County Educators' perception of the infographic content using a 3-point level of agreement Likert scale ("agree," "neither agree or disagree," "disagree") and an open ended questions. In addition, Educators' perceptions of the infographic layout, artwork, and overall infographic using a 3-point level of agreement Likert scale ("agree," "neither agree or disagree," "disagree") and open ended questions. Furthermore, Educators' perception of the usefulness of the infographic for consumers using a 3-point level of agreement Likert scale ("agree," "neither agree or disagree," "disagree"). In addition, Educators' perception of their use of the infographic using a 3-point level of agreement Likert scale ("agree," "neither agree or disagree," "disagree"). Lastly, an open ended question was included in the survey asking if County Educators had any other recommendations regarding the infographic. The formative assessment survey was put into Qualtrics, an online survey design, distribution, analysis, and reporting software (Qualtrics LLC, Provo, UT) (Appendix B).

### ***Formative Assessment Survey***

Please answer the following questions based on your perception of the LEAD infographic.

1. The infographic supplements the content presented in the LEAD curriculum. (3 point Likert scale - level of agreement)
2. The infographic **content** is accurate. (3 point Likert scale – level of agreement)
3. The infographic **content** is easy for me to understand. (3 point Likert scale – level of agreement)

4. I think the infographic **content** would be easy for the consumers to understand. (3 point Likert scale – level of agreement)
  - a. What if anything would you change about the infographic **content**? (open ended)
5. The infographic **layout** is visually appealing. (3 point Likert scale - level of agreement)
  - a. What if anything would you change about the infographic **layout**? (open ended)
6. The infographic **artwork** is visually appealing. (3 point Likert scale - level of agreement)
  - a. What if anything would you change about the infographic **artwork**? (open ended)
7. The **overall** infographic is appealing. (3 point Likert scale - level of agreement)
  - a. What if anything would you change about the **overall** infographic? (open ended)
8. I think the infographic will be useful to consumers. (3 point Likert scale – level of agreement)
9. I will use the infographic when conducting T2DM education (3 point Likert scale – level of agreement)
10. Is there anything else you would recommend regarding the infographic? (open ended)

### ***Ethical Procedure***

Before conducting the formative assessment of the T2DM infographic with OCES FCS County Educators, approval from the Oklahoma State University Institutional Review Board (OSU IRB) was obtained (Appendix C).

### ***Formative Assessment of the LEAD Infographic with OCES FCS County Educators***

Formative Assessment of the LEAD infographic was conducted with OCES FCS County Educators who attended the LEAD curriculum in-service training. An OSU IRB approved e-mail was sent to the 51 OCES FCS County Educators who attended the LEAD curriculum in-service training (Appendix D). The e-mail included a description of the purpose of the research project, the OSU IRB approved participant information form (Appendix E), the LEAD infographic (Appendix A), and a link to the Qualtrics survey (Appendix B). OCES FCS County Educators consent to participate in the formative assessment of the LEAD infographic was obtained in the first Qualtrics survey question (Appendix B).

### ***Data Analysis***

Data was analyzed using the frequency procedure with PC SAS for Windows, Version 9.3 (SAS institute, Cary, NC). Comments to open-ended questions were grouped by the researcher.

## CHAPTER IV

### FINDINGS

Out of the 51 OCES FCS County Educators sent the email, three had retired since completing the LEAD in-service training and one was on maternity leave at the time the email was sent, leaving a total of 47 OCES FCS County Educators able to respond. Out of the 47 OCES FCS County Educators able to respond, 44 responded to the email, but 3 OCES FCS County Educators chose not to complete the survey. In all, 41 OCES FCS County Educators completed the formative assessment survey (87% response rate).

Data was analyzed using the frequency procedure with PC SAS software on all questions utilizing the Likert scale for level of agreement, which were analyzed to determine if OCES FCS County Educators liked and agreed with the infographic and if they perceived the infographic to be useful. Open-ended question responses were separated into categories based on the frequency they were reported to determine any changes OCES FCS County Educators would like to see in the infographic.

Table 2 shows response frequencies for questions related to OCES FCS County Educators level of agreement regarding specific aspects of the infographic. Responses of “agree” were classified as positive feedback, while “neither agree or disagree” or “disagree” were classified as negative feedback. Responses regarding County Educators’ perception of the infographic are as follows: 98% of Educators agreed the infographic content supplemented the LEAD curriculum, 95%

agreed the infographic information was accurate, and 97% and 93% agreed the infographic was easy for the Educators to understand and that it would be easy for the consumer to understand, respectively. Relative to the appeal of the infographic: 90%, 85%, and 90% of the Educators agreed the infographic layout, artwork, and overall infographic was appealing, respectively. Ninety-five percent and 97% of the Educators agreed the infographic would be useful to consumers and that the Educators themselves would use the infographic when conducting T2DM education, respectively.

Table 2. Oklahoma Cooperative Extension Service, Family and Consumer Sciences County Educators Responses to the Likert Scale Questions Regarding the T2DM Infographic.

Likert Scale Questions regarding the T2DM infographic	n	Agree n (%)*	Neither Agree or Disagree n (%)*	Disagree n (%)*
The infographic supplements the content presented in the LEAD curriculum.	41	40 (98%)	1 ( 2%)	-
The infographic content is accurate.	41	39 (95%)	2 ( 5%)	-
The infographic content is easy for me to understand.	40	39 (97%)	1 ( 3%)	-
I think the infographic content would be easy for consumers to understand.	41	38 (93%)	3 ( 7%)	-
The infographic layout is visually appealing.	41	37 (90%)	4 (10%)	-
The infographic artwork is visually appealing.	41	35 (85%)	5 (12%)	1 (3%)
The overall infographic is appealing.	39	35 (90%)	4 (10%)	-
I think the infographic will be useful to consumers.	40	38 (95%)	2 ( 5%)	-
I will use the infographic when conducting T2DM education	39	38 (97%)	1 ( 3%)	-

\*Percents may not total to 100 due to rounding.

Table 3 shows OCES FCS County Educators responses to the open ended questions regarding the infographic. The table displays all suggestions from the 41 County Educators who provided

responses. Suggestions are separated by category and the frequency of suggestions is reported. OCES FCS County Educators responses to the open ended questions are as follows: 2% of the Educators suggested the addition of contact information for further information about T2DM, 22% suggested the addition of color to the infographic, 10% suggested increasing the font size, and 2% suggested making the figure unisex.

Table 3. Oklahoma Cooperative Extension Service, Family and Consumer Sciences County Educators' Suggestions to Open Ended Questions Regarding the T2DM Infographic.

Open ended questions regarding the T2DM infographic	n (%)*
What if anything would you change about the infographic content?	
Add contact information	1 ( 2%)
What if anything would you change about the infographic layout?	
Add color	9 (22%)
Increase font size	4 (10%)
What if anything would you change about the infographic artwork?	
Change figure to be unisex	1 ( 2%)
What if anything would you change about the overall infographic?	no comments
Is there anything else you would recommend regarding the infographic?	no comments

\*Percentages calculated based on 41 participants who completed the formative assessment survey.

## CHAPTER V

### DISCUSSION

Based on the results, majority of OCES FCS County Educators agreed the infographic content supplemented the LEAD curriculum, was accurate, and was easy to understand for both themselves and consumers. The majority of OCES FCS County Educators also agreed the infographic was appealing and would be useful when conducting T2DM education. Even though the majority of OCES FCS County Educators provided positive feedback, they also provided suggestions for improving the infographic, which included adding contact information for further questions and information, adding color, increasing font size, and making the figure in the infographic unisex. However, not all comments were based on areas of improvements. One County Educator provided positive feedback by adding the comment “I think it [infographic] would be very useful...quick and easy to read. Brings up a lot of topics but isn’t so busy that I would give up on reading it.”

Infographics are a form of representing data while focusing on a visual aspect. Segel and Heer explain the visual component of the infographic plays just as an important role in delivering the information as the text instead of being secondary or supportive to the text (Segel & Heer, 2010). Infographics have also been shown to increase audiences’ engagement with the message content (Lazard & Atkinson, 2015). Our data suggests this may be the case as well, being that the

majority of County Educators agreed that not only would the infographic content would be easy for consumers to understand, the infographic would also be useful to consumers.

In order for the infographic to be more effective, further work must be conducted related to the suggestions made by the OCES FCS County Educators. However, when making the suggested improvements the cost and the size of the infographic must be taken into consideration. These were both issues that were expected; however, due to the cost of adding color and the ease in being able to duplicate, the black and white and 8 1/2 “ x 11” version was selected for initial assessment. If the font size were to be increased the infographic would have to increase in size or there would have to be a compromise in the amount of information provided in the infographic. Making the figure unisex could be accomplished with the assistance of the graphic designer. In order to add space for contact information the graphic designer would need to add a blank field into the infographic PDF where County Educators could insert their individual county contact information. Based on the input from the County Educators and feasibility due to cost, the researcher would recommend adding color to the infographic and a link to OCES County contacts. In order to increase font size the researcher would recommend turning the infographic into a brochure, which would allow for a larger font size.

### ***Limitations***

A limitation of this study is the small sample size and the fact that respondents were all Oklahoma Cooperative Extension Service County Educators. Therefore the results of this study cannot be generalized to the public as a whole.



### ***Future Research***

Since this research cannot be generalized to the public as a whole, future research could be to conduct formative assessment on the revised infographic/brochure with the general public.

## CHAPTER VI

### CONCLUSION

In conclusion, the majority of OCES FCS County Educators provided positive feedback regarding the T2DM infographic. Based on the Likert scale questions it was determined that the infographic accurately reinforced key concepts of diabetes including: 1) What is T2DM, 2) Effects of high blood glucose and 3) Key T2DM management concepts including: a) Living well, b) Eating well, c) Being physically active, and d) Maintaining a healthful weight. The majority of County Educators agreed that the infographic was appealing, would be useful to consumers and useful to County Educators when providing T2DM education. Minor improvements could be made in regard to adding color, increasing font size, adding contact information for further information, and making the figure in the infographic unisex.

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## APPENDICES

### APPENDIX A

#### LEAD Infographic

# Live Well • Eat Well Be Active With Diabetes

**What is Type 2 Diabetes?** Type 2 diabetes is a condition where the body makes little insulin or the cells of the body do not respond to insulin. Insulin helps move glucose from the blood into the body cells to be used for energy. Without insulin, blood glucose levels stay high.

## Effects of High Blood Glucose

Over time, high blood glucose can:

- Eyes**  
Cause eye problems, including blindness.
- Mouth**  
Increase the risk of tooth and gum disease.
- Heart and Blood Vessels**  
Increase the risk of heart disease and high blood pressure.
- Circulation**  
Cause poor circulation. This is a risk factor for heart disease, high blood pressure, dry skin, infections and poor wound healing.
- Kidneys**  
Cause kidney damage. This can lead to needing dialysis or a kidney transplant.
- Nerves**  
Cause nerve damage. This can cause pain, tingling or numbness in the hands or feet. It can also cause stomach, intestine and bladder problems.
- Feet**  
Poor circulation and nerve damage are risk factors for foot injuries, infections and poor healing. This can increase the risk of amputations.

## Managing Diabetes


### Eat Well

Carbohydrate can raise blood glucose. Carbohydrate is not the enemy, just watch how much you eat. Make healthy choices and spread carbohydrate out across the day. The American Diabetes Association (ADA) says a place to start is 45–60 grams of carbohydrate per meal. You may need more or less. Find out the right amount for you. The plate method is an easy way to plan meals, control portions, and keep carbohydrate about the same at meals.




### Manage Weight

Maintain a healthy weight. If you need to lose weight, just a 10 to 15 pound loss can help control blood glucose. The best way to lose weight is through a combination of eating well and being active.




### Be Active

Regular physical activity can help control blood glucose, blood cholesterol and blood pressure. It can also help manage weight and stress. Engage in 150 minutes of moderate-intensity physical activity a week. Check with your doctor before you change your level of physical activity.




## Live Well With Diabetes

### Health Care Team




You are the most important person on your health care team.

### Regular Check-Ups




Have your doctor check your A1c. The ADA target A1c level is less than 7%. Learn what to do if your blood glucose goes too high or too low.

### Check Blood Glucose




Keep track of your blood glucose. The ADA target blood glucose ranges are 80–130 mg/dl before meals and less than 180 mg/dl two hours after a meal.

### Regular Eye Exams




Have a yearly dilated eye exam. If problems are found early, treatment can save sight.

### Have a Sick Day Plan




Sickness can raise blood glucose. Learn what to do to control blood glucose when you are sick.

### Check Your Feet




Check your feet for cuts, sores, or infections every day. See your doctor if foot problems do not go away.

### Regular Dental Exams



Have a dental exam every six months.

### Manage Stress



Stress can raise blood glucose. Learn what causes you stress and ways to manage stress.

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## APPENDIX B

### Qualtrics Survey

#### Default Question Block

##### **PARTICIPANT INFORMATION** **OKLAHOMA STATE UNIVERSITY**

**Title:** Development and Formative Assessment of a Type 2 Diabetes Infographic

**Investigator(s):** Janice Hermann, OCES Nutrition Specialist and Haley McKown, Nutritional Sciences Department graduate student, Oklahoma State University.

**Purpose:** To develop and conduct formative assessment on a type 2 diabetes infographic to supplement the Live Well, Eat Well, be Active with Diabetes (LEAD) curriculum.

**What to Expect:** Participation in this project will involve completing a Qualtrics survey assessing the LEAD infographic. You may skip any question you do not wish to answer. It should take you about 15 minutes to complete the survey.

**Risks:** There are no risks associated with this project greater than those ordinarily encountered in daily life.

**Benefits:** This project will help in the development of a type 2 diabetes infographic to supplement the LEAD curriculum. The LEAD infographic is intended to be used with consumers to visually reinforce key concepts presented in the LEAD curriculum.

**Compensation:** There is no compensation for participating in this project.

**Your Rights:** Your participation in this project is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this study at any time, without penalty.

**Confidentiality:** Your name is not collected on the Qualtrics survey. Survey data will be reported as group. Survey data will be stored securely and only people responsible for the project oversight will have access to the surveys.

**Contacts:** You may contact Janice Hermann, OCES Nutrition Specialist, 308 Human Sciences, Nutritional Sciences Department, Oklahoma State University, Stillwater, OK 74078, 405-744-460. If you have questions about your rights as a research volunteer, you may contact the IRB Office at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu)

If you agree to participate, please click "I agree to participate in this survey" below. By clicking "I agree to participate in this survey" you are indicating that you freely and voluntarily and agree to participate in this project and you also acknowledge that you are at least 18 years of age.

- ☐ I agree to participate in this survey
- ☐ I do not agree to participate in this survey

Please answer the following questions based on your perception of the LEAD infographic.

The infographic supplements the content presented in the LEAD curriculum.

Agree                      Neither Agree nor Disagree                      Disagree

The infographic content is accurate.

Agree                      Neither Agree nor Disagree                      Disagree

The infographic content is easy for me to understand.

Agree

Neither Agree nor Disagree

Disagree



I think the infographic content would be easy for consumers to understand.

Agree

Neither Agree nor Disagree

Disagree



What if anything would you change about the infographic content?  
(Please be specific and use complete sentences)

\_\_\_\_\_

\_\_\_\_\_

The infographic layout is visually appealing.

Agree

Neither Agree nor Disagree

Disagree



What if anything would you change about the infographic layout?  
(Please be specific and use complete sentences)

\_\_\_\_\_

The infographic artwork is visually appealing.

Agree

Neither Agree nor Disagree

Disagree



What if anything would you change about the infographic artwork?  
(Please be specific and use complete sentences)

\_\_\_\_\_

The overall infographic is appealing.

Agree

Neither Agree nor Disagree

Disagree



What if anything would you change about the overall infographic?  
(Please be specific and use complete sentences)

I think the infographic will be useful to consumers.

Agree

Neither Agree nor Disagree

Disagree

I will use the infographic when conducting type 2 diabetes education.

Agree

Neither Agree nor Disagree

Disagree

Is there anything else you would recommend regarding the infographic?  
(Please be specific and use complete sentences)

## APPENDIX C

### Oklahoma State University Institutional Review Board Approval Letter

#### Oklahoma State University Institutional Review Board

Date: Thursday, October 01, 2015  
IRB Application No HE1553  
Proposal Title: Development and formative assessment of a type 2 diabetes infographic

Reviewed and  
Processed as: Exempt

**Status Recommended by Reviewer(s): Approved Protocol Expires: 9/30/2018**

Principal  
Investigator(s):

Haley McKown	Janice R. Hermann
4701 N Washington St.#1408	315 HES
Stillwater, OK 74075	Stillwater, OK 74078

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The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2. Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Scott Hall (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Hugh Crethar, Chair  
Institutional Review Board

## APPENDIX D

### E-Mail to OCES FCS County Educators Who Attended the LEAD Curriculum In-service

#### **E-Mail to OCES FCS County Educators who attended the LEAD curriculum in-service**

Dear OCES FCS County Educators

You are receiving this e-mail because you attended one of the Live Well, Eat Well, be Active with Diabetes (LEAD) curriculum in-service trainings.

Haley McKown (MS student in Nutritional Sciences) and I have developed a type 2 diabetes infographic to supplement the LEAD curriculum. The infographic is intended for you to use with consumers to visually reinforce key concepts presented in the LEAD curriculum.

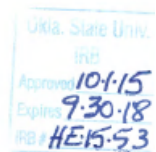
I have attached the LEAD infographic for your reference. We would like to request your input in assessing the LEAD infographic. The development and assessment of the LEAD infographic is Haley's thesis project. Your participation in the infographic assessment is voluntary. The following is a link to the Qualtrics survey assessing the LEAD infographic.

[https://okstateches.az1.qualtrics.com/SE/?SID=SV\\_9H4ZC00VAh702qN](https://okstateches.az1.qualtrics.com/SE/?SID=SV_9H4ZC00VAh702qN)

Thank you for everything you do.

Sincerely,

Janice Hermann



## APPENDIX E

### Participant Information Form

#### PARTICIPANT INFORMATION OKLAHOMA STATE UNIVERSITY

**Title:** Development and Formative Assessment of a Type 2 Diabetes Infographic

**Investigator(s):** Janice Hermann, OCES Nutrition Specialist and Haley McKown, Nutritional Sciences Department graduate student, Oklahoma State University.

**Purpose:** The purpose of this project is to develop and conduct formative assessment on a type 2 diabetes infographic, to supplement the Live Well, Eat Well, be Active with Diabetes (LEAD) curriculum.

**What to Expect:** Participation in this project will involve completing a Qualtrics survey assessing the LEAD infographic. You may skip any question you do not wish to answer. It should take you about 15 minutes to complete the survey.

**Risks:** There are no risks associated with this project greater than those ordinarily encountered in daily life.

**Benefits:** This project will help in the development of a type 2 diabetes infographic to supplement the LEAD curriculum. The LEAD infographic is intended to be used with consumers to visually reinforce key concepts presented in the LEAD curriculum.

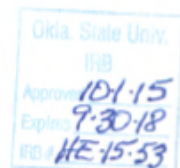
**Compensation:** There is no compensation for participating in this project.

**Your Rights:** Your participation in this project is voluntary. There is no penalty for refusal to participate, and you are free to withdraw your consent and participation in this study at any time, without penalty.

**Confidentiality:** Your name is not collected on the Qualtrics survey. Survey data will be reported as group. Survey data will be stored securely and only people responsible for the project oversight will have access to the surveys.

**Contacts:** You may contact Janice Hermann, OCES Nutrition Specialist, 308 Human Sciences, Nutritional Sciences Department, Oklahoma State University, Stillwater, OK 74078, 405-744-460. If you have questions about your rights as a research volunteer, you may contact the IRB Office at 223 Scott Hall, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu)

Please, click "I agree to participate in this survey" below. By clicking "I agree to participate in this survey" you are indicating that you freely and voluntarily and agree to participate in this project and you also acknowledge that you are at least 18 years of age.



## VITA

Haley Danielle McKown

Candidate for the Degree of

Master of Science

Thesis: DEVELOPMENT AND FORMATIVE ASSESSMENT OF A TYPE 2  
DIABETES SOCIAL MARKETING INFOGRAPHIC

Major Field: Nutritional Sciences

Biographical:

Education:

Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in May, 2016.

Completed the requirements for the Bachelor of Science in Nutritional Sciences at Texas A&M University, College Station, Texas in 2014.

Experience:

Worked for Oklahoma Cooperative Extension as a Graduate Research Assistant and assisted in developing diabetes prevention related material for Oklahoma residents from October 2014 to July 2015.

Worked for Texas A&M AgriLife Extension as a student worker and assisted in informing women across Texas about breast and cervical cancer prevention from June 2012 to July 2014.

Professional Memberships:

Participated in the Graduate student in Nutrition Sciences Club as an officer, helped plan member meetings and attended Graduate and Professional Student Government Association meetings every two weeks from August 2014 to May 2015.